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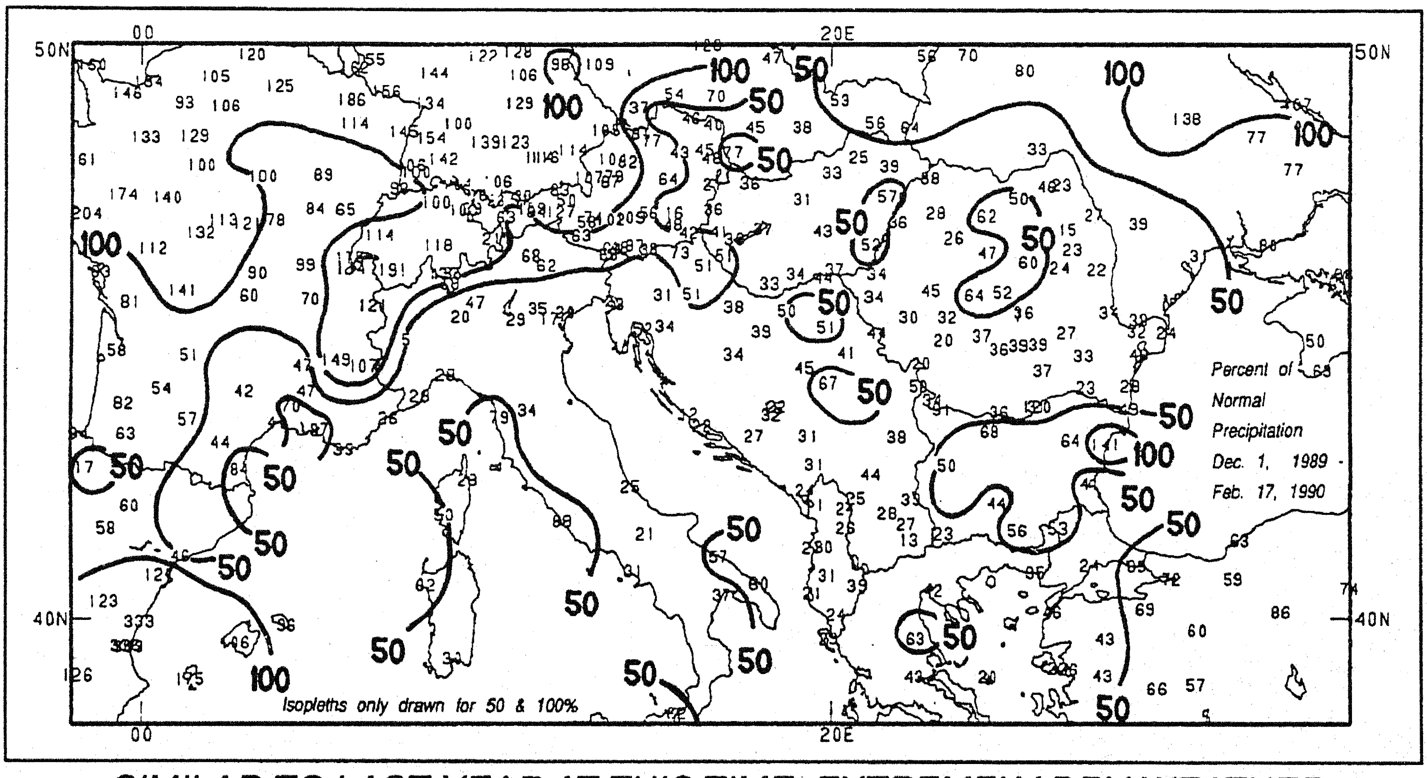
WEEKLY CLIMATE BULLETIN

No. 90/07 **Washington, DC** **February 17, 1990**



SIMILAR TO LAST YEAR AT THIS TIME, EXTREMELY DRY WEATHER HAS AFFLICTED MUCH OF SOUTH–CENTRAL AND SOUTHEASTERN EUROPE THIS WINTER SEASON (SINCE DECEMBER 1, 1989). IN CENTRAL EUROPE, LAST WEEK'S COPIOUS PRECIPITATION (UP TO 350 MM) PUSHED SEASONAL PRECIPITATION TOTALS TO ABOVE NORMAL LEVELS BUT PRODUCED LANDSLIDES AND FLOODING IN SECTIONS OF THE WESTERN ALPS. DEFICITS SURPASSING 200 MM HAVE ACCUMULATED IN WESTERN YUGOSLAVIA AND ALBANIA.

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE–NATIONAL METEOROLOGICAL CENTER
CLIMATE ANALYSIS CENTER

WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- *Highlights of major climatic events and anomalies.*
- *U.S. climatic conditions for the previous week.*
- *U.S. apparent temperatures (summer) or wind chill (winter).*
- *U.S. cooling degree days (summer) or heating degree days (winter).*
- *Global two–week temperature anomalies.*
- *Global four–week precipitation anomalies.*
- *Global monthly temperature and precipitation anomalies.*
- *Global three–month precipitation anomalies (once a month).*
- *Global twelve–month precipitation anomalies (every three months).*
- *Global three–month temperature anomalies for winter and summer seasons.*
- *Special climate summaries, explanations, etc. (as appropriate).*

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL CLIMATE HIGHLIGHTS

ſAJOR CLIMATIC EVENTS AND ANOMALIES AS OF FEBRUARY 17, 1990

United States:

WINTER REMAINS DORMANT.

conditions continued as temperatures averaged 4°C to 9°C ıal. The northern and western fringes, however, finally l more typical February temperatures as mild weather ss the northern Plains, upper Midwest, and northern New weeks].

ı *U.S.*:

: WEATHER AND TORRENTIAL DOWNPOURS HIT REGION.

t of cold air pushing into warmer air once again triggered : of severe weather in the lower Mississippi Valley and f Coast. Heavy rainfall (up to 244 mm) inundated the and several instances of tornadoes, high winds, large hail, ; occurred from Louisiana to Pennsylvania [5 weeks].

stern U.S. and Southwestern Canada:

ODERATE PRECIPITATION REPORTED.

inundating rains and snows eased slightly as most of the ·ved between 30 mm and 70 mm of precipitation, although ls of nearly 140 mm were recorded in portions of western addition, colder weather allowed heavy snows to blanket ions surrounding the Cascades [6 weeks].

stern North America, Eastern Siberia, and Kamchatka:

FRIGID WEATHER CONTINUES.

d Arctic air remained entrenched as departures reached e Canadian Yukon. Temperatures plunged down to −57°C of eastern Siberia while wind chills as low as −84°C ;tern sections of Canada's Northwest Territories [3 weeks].

tral South America:

MORE WIDESPREAD FLOODING.

ıins (up to 350 mm) generated additional urban and river oss most of Uruguay and extreme southern Brazil. Light occurred elsewhere as amounts ranged from 10 mm to 00 mm [4 weeks].

6. *Northern half of Europe*:

UNSEASONABLY MILD WEATHER PERSISTS AS PRECIPITATION SLACKENS.

Departures exceeded +10°C in parts of Finland and the European Soviet Union while above normal temperatures engulfed much of the continent [5 weeks]. Precipitation totals, however, eased slightly although the central British Isles and eastern Scandinavia recorded 40 to 80 mm [Ending after 5 weeks].

7. *Central and Southeastern Europe*:

PRECIPITATION SOAKS CENTRAL EUROPE WHILE ITALY, BALKANS REMAIN DRY.

The dry conditions that plagued western France, southern Germany, Switzerland, Austria, Hungary, and extreme northern Italy abruptly ended as moderate to heavy precipitation (up to 300 mm) brought welcome relief. In the western Alps, heavy rains and rapid snowmelt produced landslides and flooding. Farther south, however, abnormal dryness remained across most of the Iberian Peninsula, Italy, and the Balkans where less than 40 mm of precipitation fell [12 weeks].

8. *Southeastern Africa and Madagascar*:

RAINFALL RETURNS TO SEASONABLE LEVELS.

Rainfall totals generally ranged from 50 mm to 120 mm as the excessive rainfall of the past several weeks eased [Ended after 6 weeks].

9. *Northeastern Australia*:

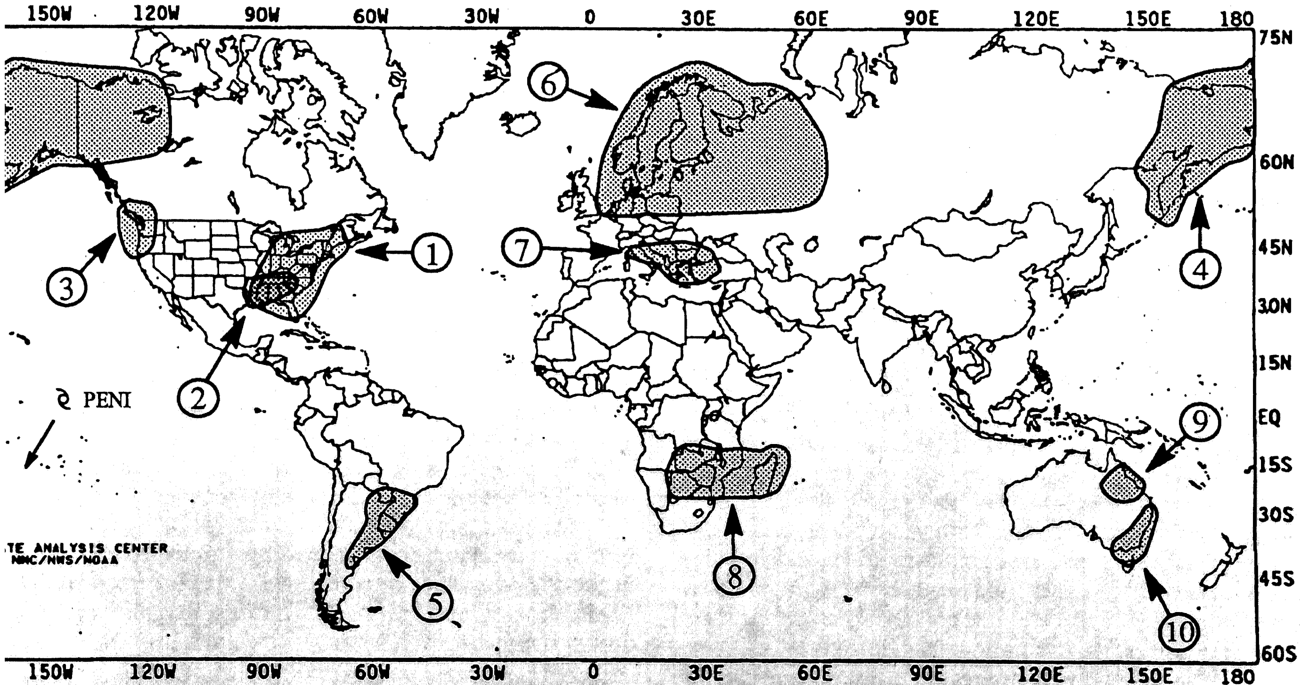
SUBNORMAL RAINY SEASON PERSISTS.

Less than 20 mm of rain was observed in northeastern Queensland as moisture deficits continued to grow. Most stations have measured less than 25% of normal rainfall during the past nine weeks [9 weeks].

10. *Southeastern Australia*:

WIDESPREAD HEAVY RAINS END.

Although isolated rainfall totals approaching 70 mm were reported along the eastern New South Wales coast, most stations measured less than 30 mm of rain as precipitation diminished [Ended after 3 weeks].



EXPLANATION

T: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.
P: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long–term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF FEBRUARY 11 THROUGH FEBRUARY 17, 1990

Winter staged a comeback in the western and central U.S. while unseasonably mild conditions have persisted across much of the eastern half of the country since the beginning of the year. A complex storm system slowly tracked out of the southern Rockies and moved northeastward, generating intense thunderstorms that spawned several tornadoes, large hail, damaging winds, and torrential downpours in the Southeast. The heavy rains (nearly 10 inches) produced severe flooding in parts of southeastern Tennessee, northern Georgia, and western North Carolina. In the colder air to the north and west of the low pressure center, freezing rain, sleet, and snow glazed sections of the central Rockies and Plains, the Midwest, Great Lakes, and the northern Appalachians. Farther west, ample precipitation fell on portions of the Cascades and Sierra Nevadas while cold and snowy weather afflicted the western halves of Washington, Oregon, and Nevada. According to reports, elevations above 7000 feet in the Lake Tahoe basin were buried under 6 FEET of snow, and central and southern California finally received badly–needed moderate to heavy rainfall. The 2.17 inches of rain at Los Angeles on February 17 was the station's largest daily total in over 4 years. This week's stormy weather in the Far West elevated statewide mountain snow water content and precipitation levels closer to normal, especially in the Southwest, but most areas still required much more precipitation (see Tables 4 and 5).

Slightly cooler and drier than usual conditions prevailed across Hawaii while bitterly cold Arctic air continued to grip much of Alaska for the third straight week. Readings plunged to –54°F at Northway, and statewide temperatures generally averaged more than 10°F below normal. On Tuesday, Valdez set a new winter snowfall record of 387 inches (normal winter total = 304 inches), and several more weeks still remain in the snow season. Farther west, a blizzard blasted western sections of the state on Thursday.

Early in the week, a departing cold front triggered scattered showers and thunderstorms in drought–stricken southern Florida, but amounts were generally under a half an inch. A storm system entered the Pacific Northwest, bringing heavy snows to the Cascades and unusually cold air to the region. In contrast, unseasonably mild weather prevailed throughout the central and eastern U.S. As the system pushed eastward, heavy snows blanketed the northern and central Rockies and bitterly cold Arctic air enveloped the northern Rockies, Plains, and upper Midwest. An upper–air disturbance slowly tracked eastward out of the Southwest, dumping heavy snows on portions of Utah, northern Arizona, and western Colorado.

By mid–week, a slow–moving cold front stretched from southern New England southwestward to the southern Great Plains. Arctic air covered the northern third of the nation while waves of low pressure developed and progressed along the cold front. To the north of the front, freezing rain, sleet, and snow caused hazardous conditions in the south–central Plains, middle Mississippi Valley, Great Lakes, and northern New England. In the warm and unstable air ahead of the cold front, severe weather broke out in the lower Mississippi, Tennessee, and lower Ohio Valleys. Farther west, a complex storm system invaded the Pacific Northwest, generating moderate to heavy snow in the lower elevations surrounding the Cascades. Up to 12 inches of snow fell between Whidbey Island and Olympia, WA.

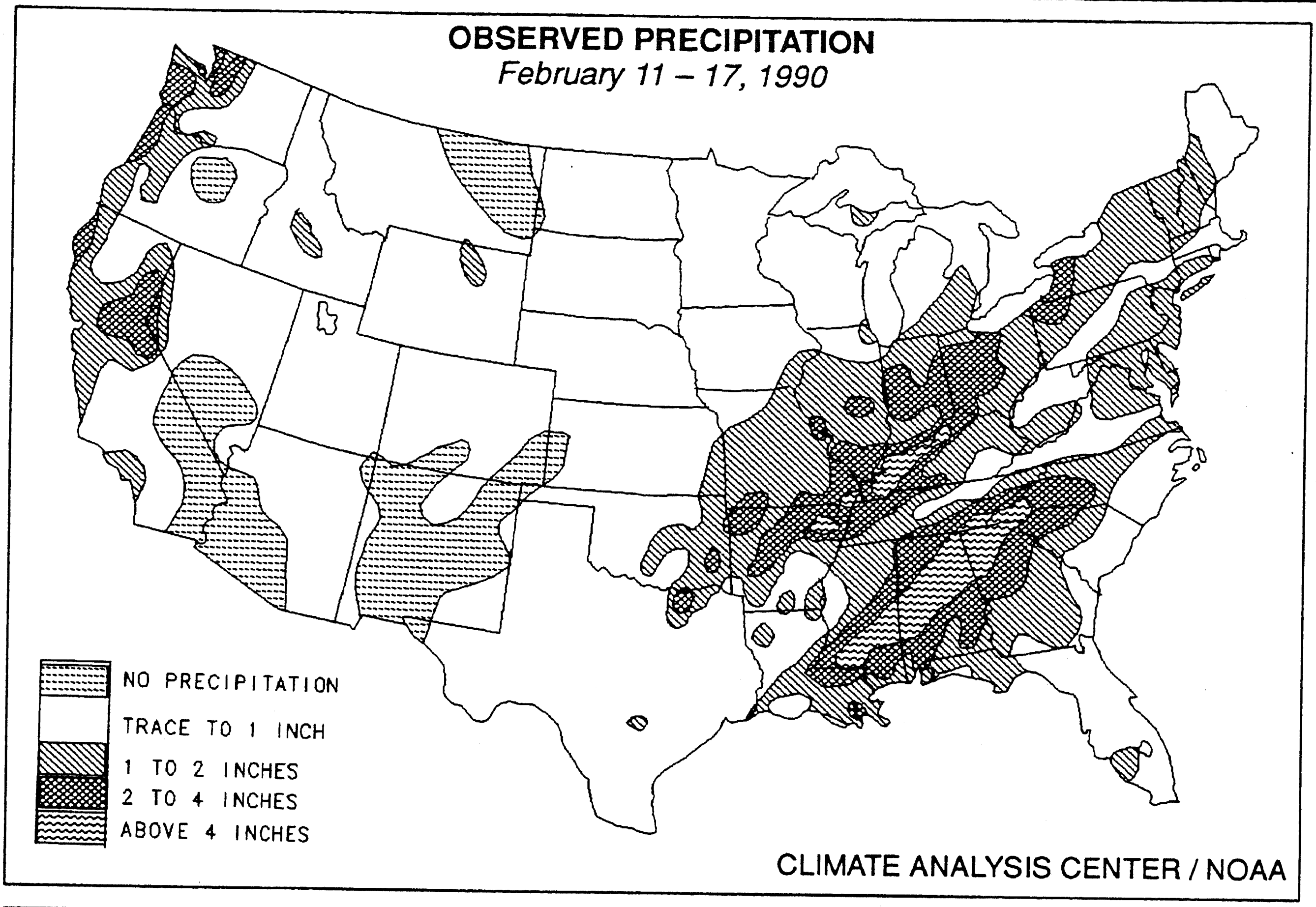
Towards the week's end, the system in the East finally pushed off the Atlantic Coast by late Saturday, but not before producing additional severe weather from Georgia northward into Virginia. The Pacific Northwest system moved southeastward into the Great Basin by Saturday, triggering heavy snows in the Cascades, Sierra Nevadas, and central Rockies. Some of the heaviest rainfall in the past few years soaked parts of southern California. Mount Wilson, just to the east of Los Angeles, measured 4.62 inches of rain from Friday afternoon until early Saturday evening. Drier but colder conditions covered most of the eastern half of the country on Saturday.

According to the River Forecast Centers, the greatest weekly precipitation amounts (more than 6 inches) occurred in central Mississippi, northern Alabama, northern Georgia, and western North Carolina (see Table 1, Figure 1). Elsewhere, heavy totals (between 2 and 6 inches) were recorded along the Pacific Northwest Coast, in the Cascades and Sierra Nevadas, southern California, in parts of the central Rockies, the south–central Great Plains, and throughout the lower Ohio Valley, the southern Appalachians, and the eastern Great Lakes. Light to moderate amounts fell along the south–central and southeastern Alaskan Coast, on the Great Basin, the northern Intermountain West, the northern and central Rockies, most of the Plains, and throughout the eastern half of the U.S.

Little or no precipitation was observed in the north–central Intermountain West, across most of the Southwest and southern Rockies, the extreme northern High Plains, south–central Texas, and along sections of the middle and southern Atlantic Coasts.

The seventh successive week of above normal temperatures occurred in the eastern half of the nation as the greatest departures (between +13°F and +16°F) were located in the Tennessee and lower Ohio Valleys, the south–central Appalachians, and the mid–Atlantic (see Table 2). Highs in the seventies were common across the southeastern quarter of the country while nineties baked extreme southern Texas (see Figure 2). Dozens of daily maximum temperature records were set during the week in the central and eastern U.S. Much colder air, however, began to push into the central and northern states, signaling a possible end to the abnormally mild conditions.

In sharp contrast, wintry weather dominated most of Alaska and the western third of the nation. Temperatures averaged more than 10°F below normal in parts of the Pacific Northwest, northern California, the Great Basin, across the upper Missouri Valley and north–central High Plains, and in the Alaskan interior (see Table 3). Lows dipped below freezing along the Pacific Coast, in the agricultural valleys of central and southern California, and in southern Arizona while several new daily minimum temperature records were established during the week in the Far West. Subzero readings were common in the Great Basin, the northern half of the Rockies, the northern Plains, the upper Midwest, and extreme northern New England. Temperatures dropped under –20°F in northern areas of Montana and Minnesota.


OBSERVED PRECIPITATION
February 11 – 17, 1990
NO PRECIPITATION
TRACE TO 1 INCH
1 TO 2 INCHES
2 TO 4 INCHES
ABOVE 4 INCHES
CLIMATE ANALYSIS CENTER / NOAA

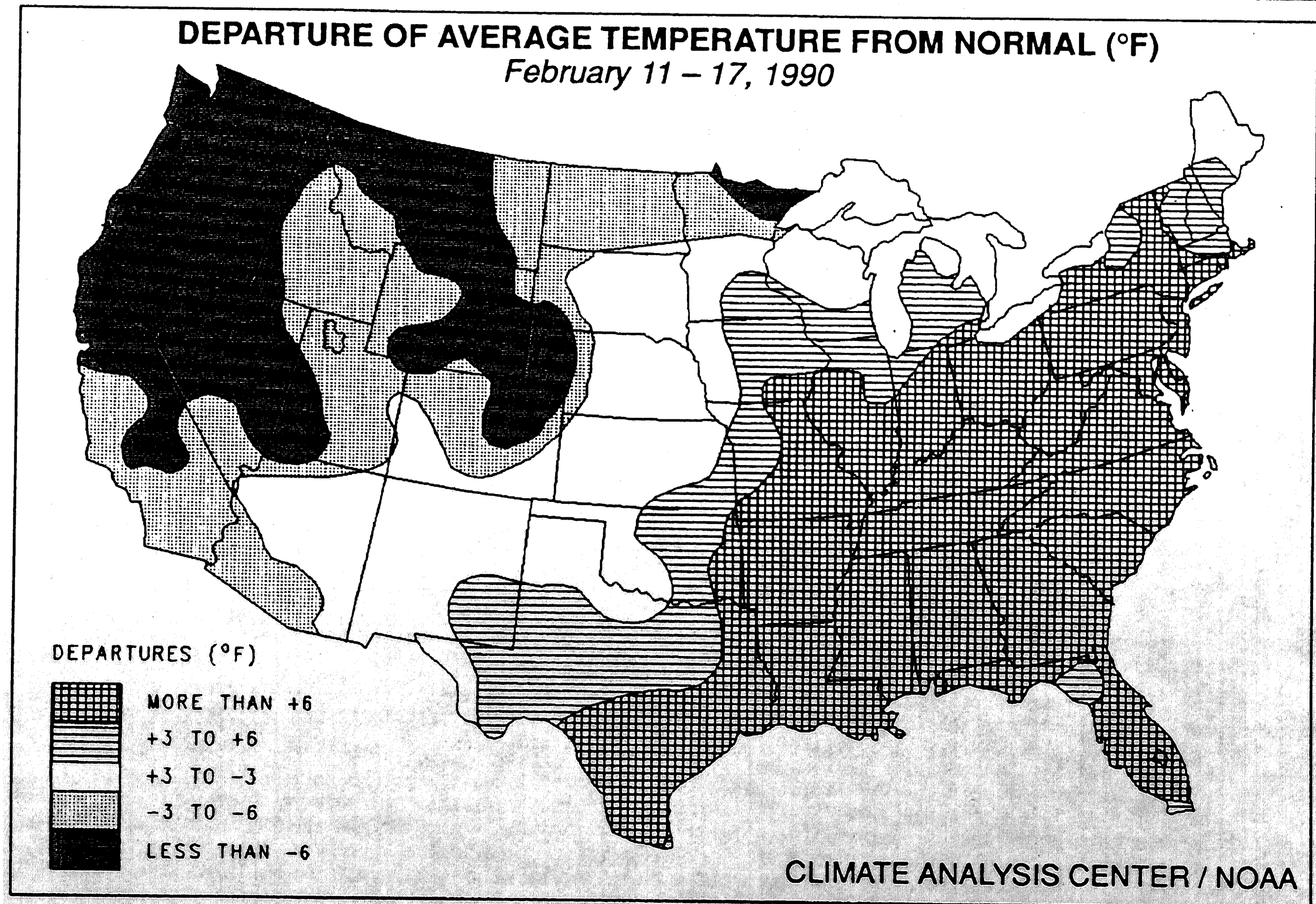

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)
February 11 – 17, 1990
DEPARTURES (°F)
MORE THAN +6
+3 TO +6
+3 TO -3
-3 TO -6
LESS THAN -6
CLIMATE ANALYSIS CENTER / NOAA

TABLE 1. Selected stations with 2.00 or more inches of precipitation for the week.

STATION	TOTAL (INCHES)	STATION	TOTAL (INCHES)
MERIDIAN, MS	9.73	GREENVILLE, SC	2.46
CENTERVILLE, GA	7.55	ATLANTA, GA	2.45
MERIDIAN NAS, MS	4.68	BUFFALO, NY	2.36
CHATTANOOGA, TN	4.57	COLUMBUS, OH	2.33
ANNISTON, AL	4.21	KNOXVILLE, TN	2.31
PADUCAH, KY	4.15	JONESBORO, AR	2.29
TUSCALOOSA, AL	3.96	MCCOMB, MS	2.29
BIRMINGHAM, AL	3.90	DAYTON, OH	2.28
HUNTSVILLE, AL	3.84	DAYTON/WRIGHT-PATTERSON AFB, OH	2.25
FAYETTEVILLE, AR	3.76	LOS ANGELES, CA	2.23
LOUISVILLE, KY	3.66	CHARLOTTE, NC	2.20
ASHEVILLE, NC	3.36	BLYTHEVILLE AFB, AR	2.19
CAPE GIRARDEAU, MO	3.04	WEST PLAINS, MO	2.14
NEW ORLEANS/MOISANT, LA	3.02	EVANSVILLE, IN	2.14
CINCINNATI, OH	2.93	SANTA ANA MCAS, CA	2.13
BLUE CANYON, CA	2.75	MUSCLE SHOALS, AL	2.11
JACKSON, MS	2.60	EUREKA, CA	2.10
ERIE, PA	2.54	ASTORIA, OR	2.08
KOKEE, KAUAI, HI	2.54	OLYMPIA, WA	2.07
COLUMBUS/LOCKBOURNE AFB, OH	2.48	SACRAMENTO, CA	2.04

TABLE 2. Selected stations with temperatures averaging 13.0°F or more ABOVE normal for the week.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
PADUCAH, KY	+15.8	52.7	CHARLOTTE, NC	+13.7	56.4
BOWLING GREEN, KY	+15.5	52.6	COLUMBIA, SC	+13.6	60.4
JACKSON, KY	+15.5	51.5	GREENSBORO, NC	+13.6	53.2
CHARLESTON, WV	+15.3	50.7	HUNTINGTON, WV	+13.5	49.1
JACKSON, TN	+15.0	56.4	PATUXENT RIVER NAS, VA	+13.3	50.1
RALEIGH-DURHAM, NC	+14.8	56.0	EVANSVILLE, IN	+13.3	47.9
LEXINGTON, KY	+14.8	48.9	CHARLESTON, SC	+13.2	62.7
NORFOLK, VA	+14.7	55.6	CHATTANOOGA, TN	+13.2	54.8
RICHMOND/BYRD, VA	+14.5	52.9	ROANOKE, VA	+13.2	50.6
HAMPTON/LANGLEY AFB,VA	+14.4	54.9	CINCINNATI, OH	+13.2	45.0
NASHVILLE, TN	+14.4	54.6	GREENWOOD, MS	+13.1	59.9
MEMPHIS, TN	+14.1	57.3	ATLANTA, GA	+13.1	57.8
DOVER AFB, DE	+13.9	49.4	AUGUSTA, GA	+13.0	60.2
BLUEFIELD, WV	+13.9	47.4	BLYTHEVILLE AFB, AR	+13.0	56.2
BECKLEY, WV	+13.9	46.1	JONESBORO, AR	+13.0	55.2
LOUISVILLE, KY	+13.8	49.4	LYNCHBURG, VA	+13.0	50.0

TABLE 3. Selected stations with temperatures averaging 10.0°F or more BELOW normal for the week.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
CUT BANK, MT	-18.1	4.5	LEWISTOWN, MT	-12.0	12.4
BETTLES, AK	-16.2	-21.6	ANCHORAGE, AK	-11.7	6.2
TALKEETNA, AK	-14.9	-0.2	MEACHAM, OR	-11.3	18.6
BIG DELTA, AK	-14.8	-12.6	HAVRE, MT	-11.2	9.4
GREAT FALLS, MT	-14.7	12.6	REDDING, CA	-11.2	40.1
BILLINGS, MT	-14.5	14.2	HELENA, MT	-10.9	15.4
KETCHIKAN, AK	-13.6	23.6	SIDNEY, NE	-10.9	18.2
JUNEAU, AK	-13.2	14.9	SCOTTSBLUFF, NE	-10.9	19.0
SEXTON SUMMIT, OR	-13.1	24.4	UKIAH, CA	-10.9	39.4
KOTZEBUE, AK	-12.9	-17.7	MOUNT SHASTA, CA	-10.5	27.5
BURNS, OR	-12.8	20.8	BLUE CANYON, CA	-10.5	27.7
CORDOVA/MILE 13, AK	-12.7	14.2	NORTHWAY, AK	-10.5	-20.3
YAKUTAT, AK	-12.5	15.6	BELLINGHAM, WA	-10.4	30.5
KENAI, AK	-12.4	3.8	FAIRBANKS, AK	-10.1	-14.2
LOVELOCK, NV	-12.3	24.2	ANNETTE ISLAND, AK	-10.0	26.6
SHERIDAN, WY	-12.1	14.3			

Table 4.

State	Snow Water Content Feb20	Feb12	Jan29	Jan9	Precipitation Feb20	Feb12	Jan29	Jan9
	Percent of Normal				From Oct. 1, 1989–Date listed below			
Arizona	75	54	34	42	58	48	40	41
California (Great Basin area only)	60	47	39	39	64	55	50	47
Colorado	67	60	58	67	79	72	69	67
Idaho	78	80	64	60	81	85	77	77
Montana	98	103	96	91	116	120	118	119
Nevada	72	65	57	52	67	61	56	67
New Mexico	59	51	46	39	75	70	67	65
Oregon	87	80	48	34	83	82	69	66
Utah	74	62	56	48	76	65	60	56
Washington	107	106	81	54	107	110	97	88
Wyoming	88	90	88	90	96	96	96	105
West Region (except rest of California)	83	79	67	60	88	86	79	77

WESTERN REGIONAL CLIMATE CENTER and the SOIL CONSERVATION SERVICE

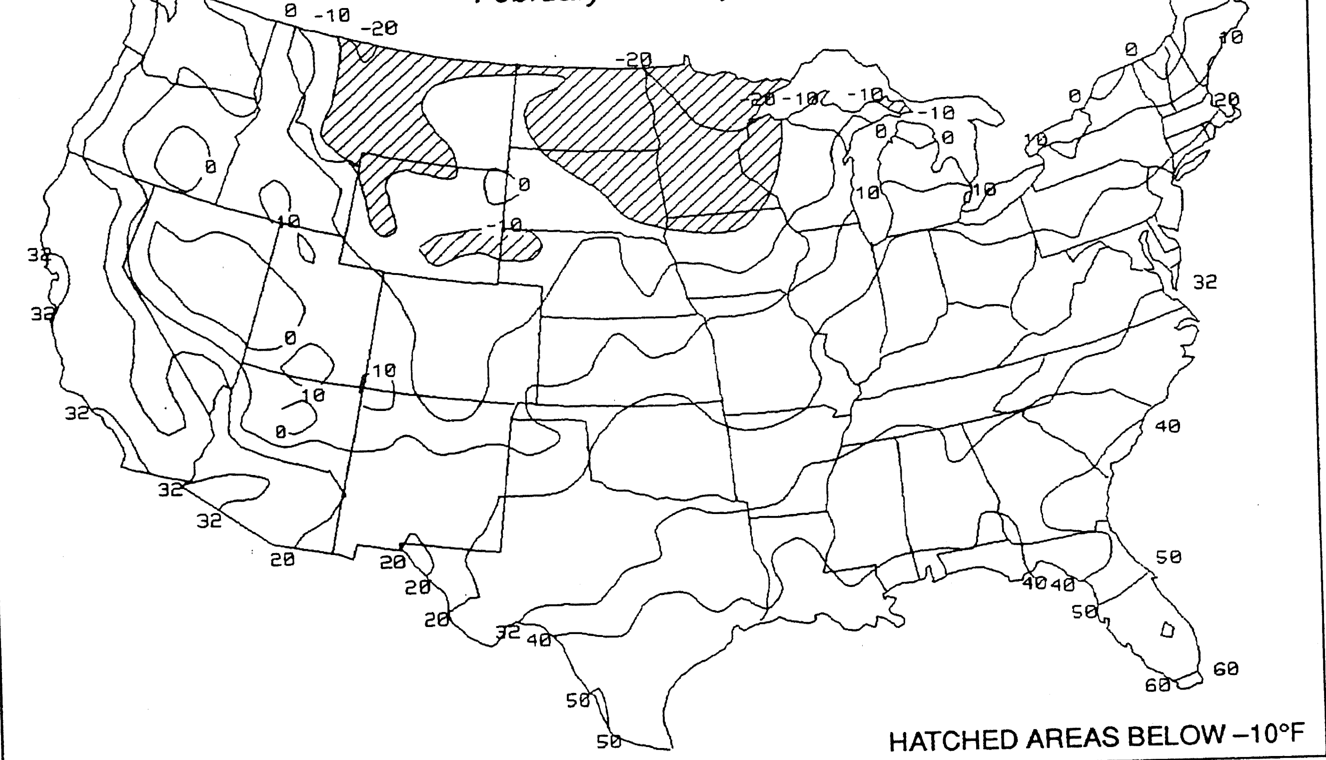
Table 5.

River Basin	Snow Water Content Feb20	Feb12	Jan29	Jan9	Precipitation Feb20	Feb12	Jan29	Jan9
	Percent of Normal				From Oct. 1, 1989–Date listed below			
Arkansas River	82	79	83	76	76	79	83	78
Colorado River	70	62	59	54	76	68	64	61
Missouri River	96	99	97	100	110	110	112	116
Columbia River	90	89	68	56	92	93	83	80
Rio Grande River	50	42	39	27	68	63	62	56
Great Basin	67	57	50	45	70	61	55	52

WESTERN REGIONAL CLIMATE CENTER and the SOIL CONSERVATION SERVICE

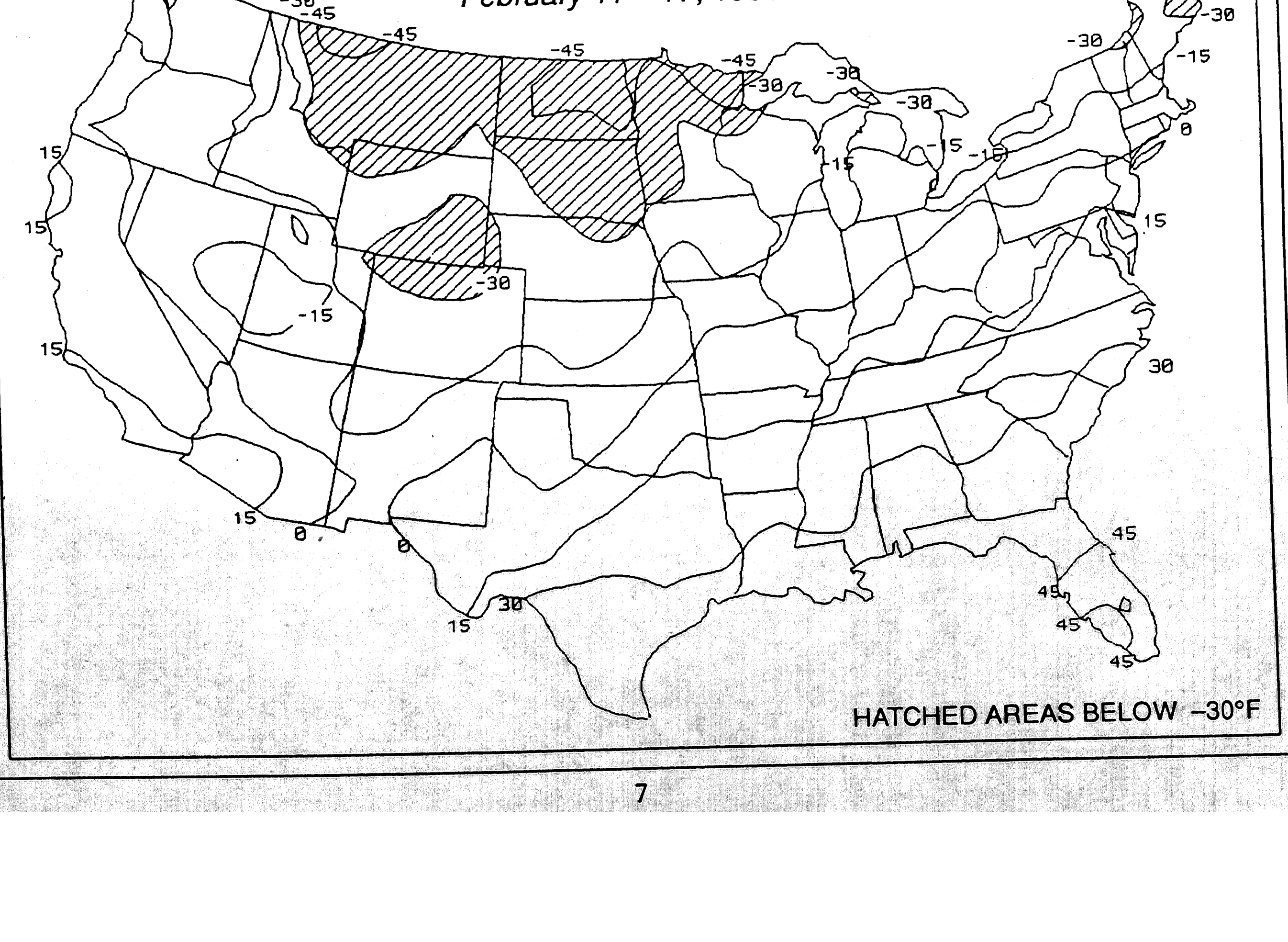
ccording to the Western Regional Climate Center and the Soil Conservation Service, last week's storms brought adly-needed precipitation to much of the Southwest, particularly central and southern California, western Nevada, rizona, Utah, southern Colorado, and New Mexico. Both the percent of mountain snow water content and the ercent of normal precipitation rose several points in the southern sections of the West, but most states and er basins were still well below normal. Examples of the past week's heavy snow totals in the Sierra Nevadas cluded the following: Sierra Snow Lab, CA (6900' elevation) 73"; Castle Peak near Kingsville, CA 68"; Sugar owl Ski Area, CA 66"; Cables Lake, CA (8000' elevation) 62"; Alpine Meadows Ski Area, CA 52"; and Reno, V 18" (Reno's ANNUAL mean snowfall=24.8").

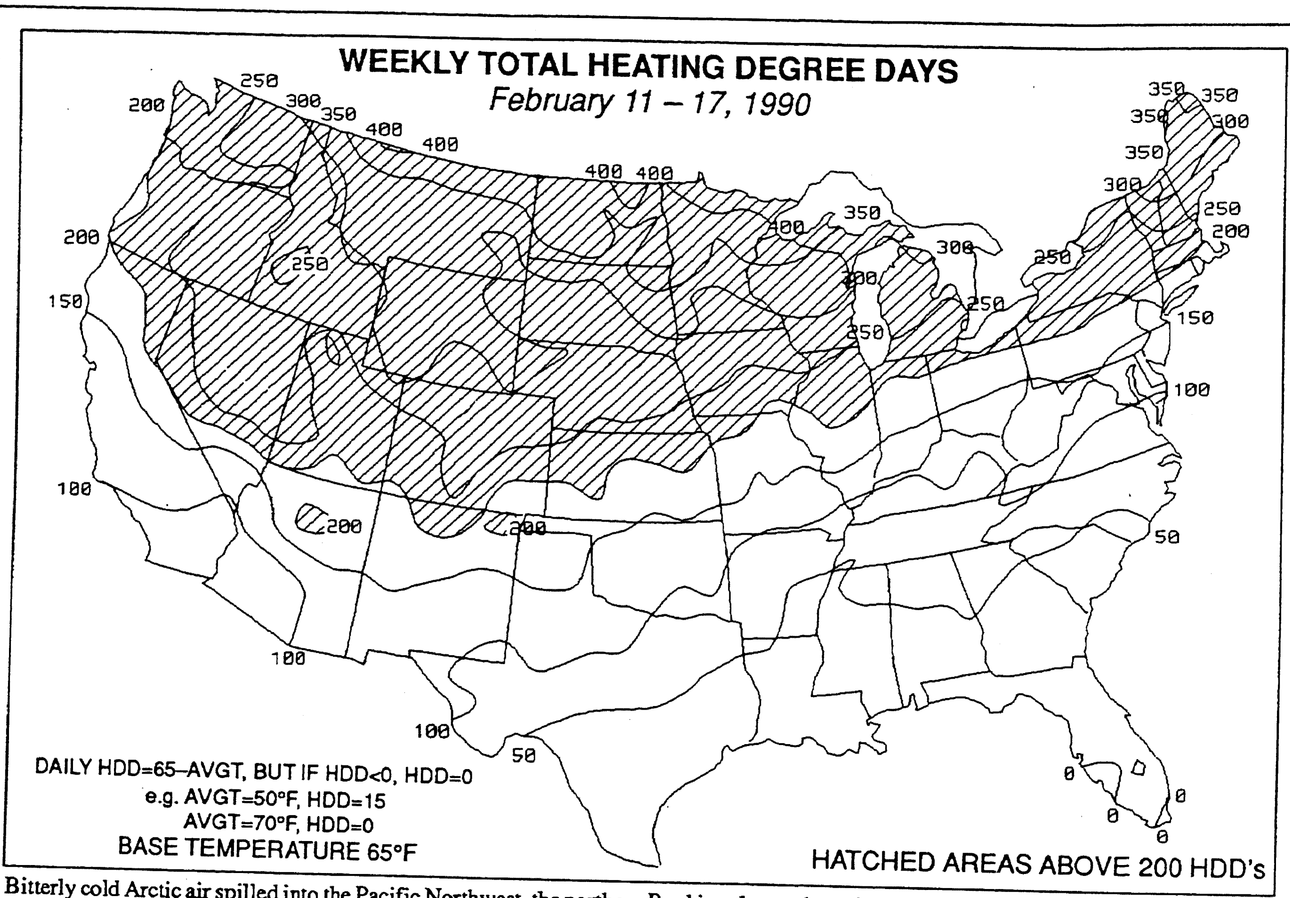
EXTREME MINIMUM TEMPERATURE (°F)
February 11 – 17, 1990



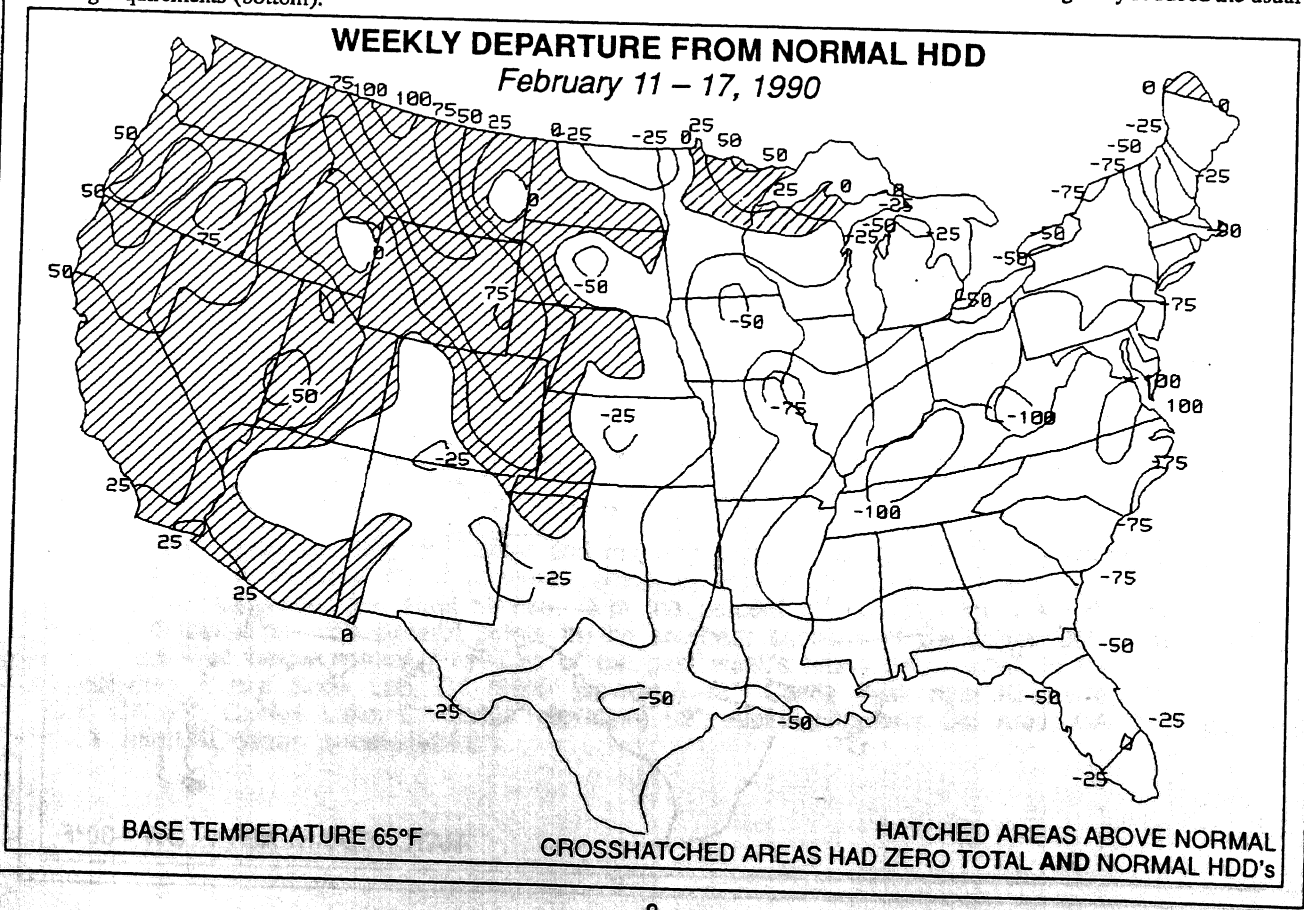
Wintery conditions dominated the Far West and returned to the extreme northern tier of states as readings below −10°F were observed in the northern Plains and upper Midwest while subfreezing temperatures chilled much of the Pacific Coast and the desert Southwest (top). Low temperatures and strong winds produced dangerous wind chills (less than −15°F) across most of the northern halves of the Rockies and Plains, the upper Midwest, and northern New England, and exceptionally low wind chills occurred along the West Coast (bottom).

MINIMUM WIND CHILL (°F)
February 11 – 17, 1990

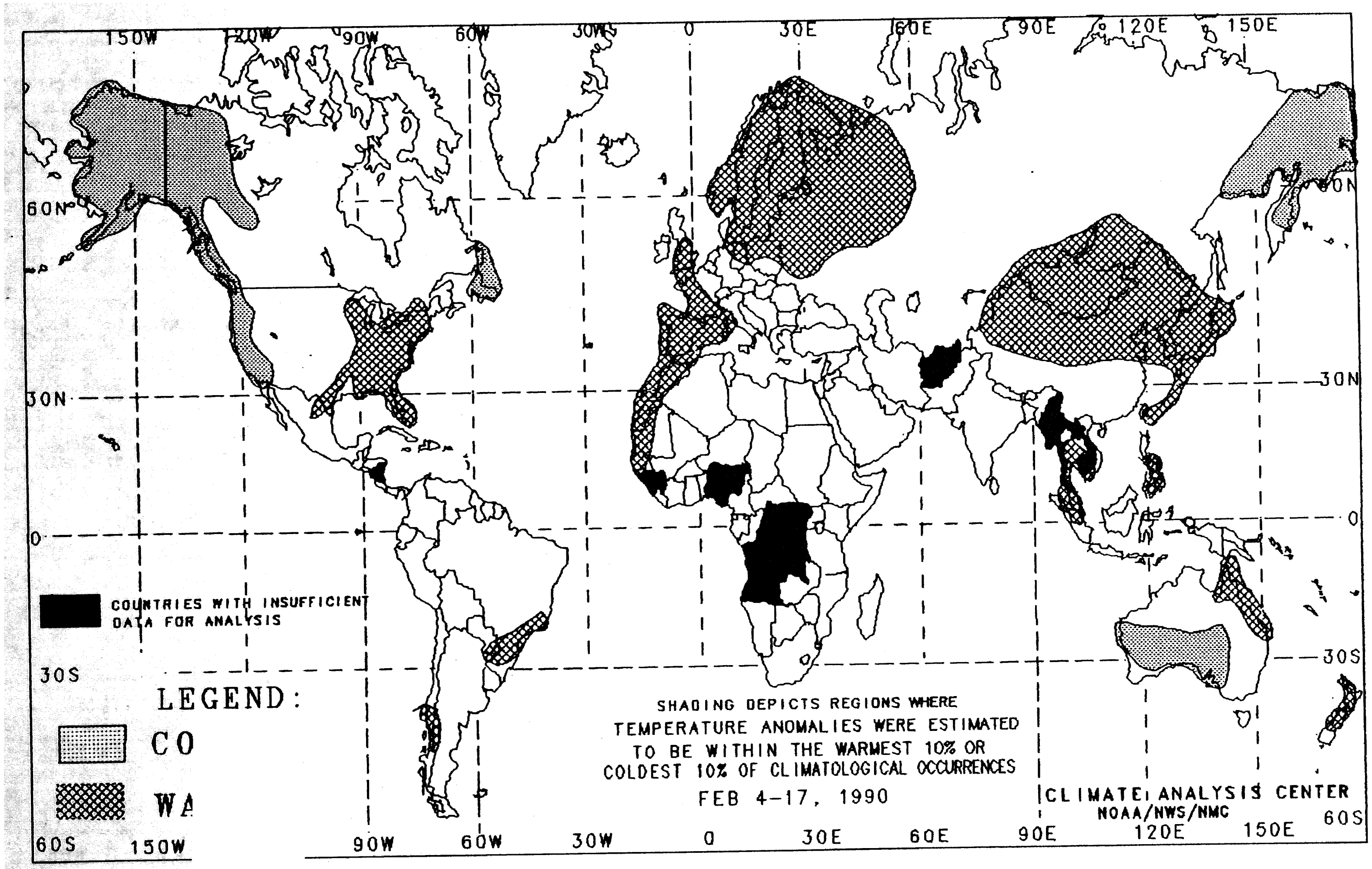




Bitterly cold Arctic air spilled into the Pacific Northwest, the northern Rockies, the northern Great Plains, and the upper Midwest, sending the weekly heating usage above 300 HDDs in the latter three regions (top). While subnormal temperatures required above normal heating demand in the West, the seventh consecutive week of unseasonably mild weather in the center half of the U.S. greatly reduced the usual heating requirements (bottom).



2 WEEKS



The anomalies on this for which at least 13 days c reports. Many stations do no observations are not taken. minimum temperature may overestimation of the extent

Temperature anomali departures from normal exc

n approximately 2500 observing stations servations were received from synoptic enty-four hour basis so many night time -se missing observations the estimated This in turn may have resulted in an alies.

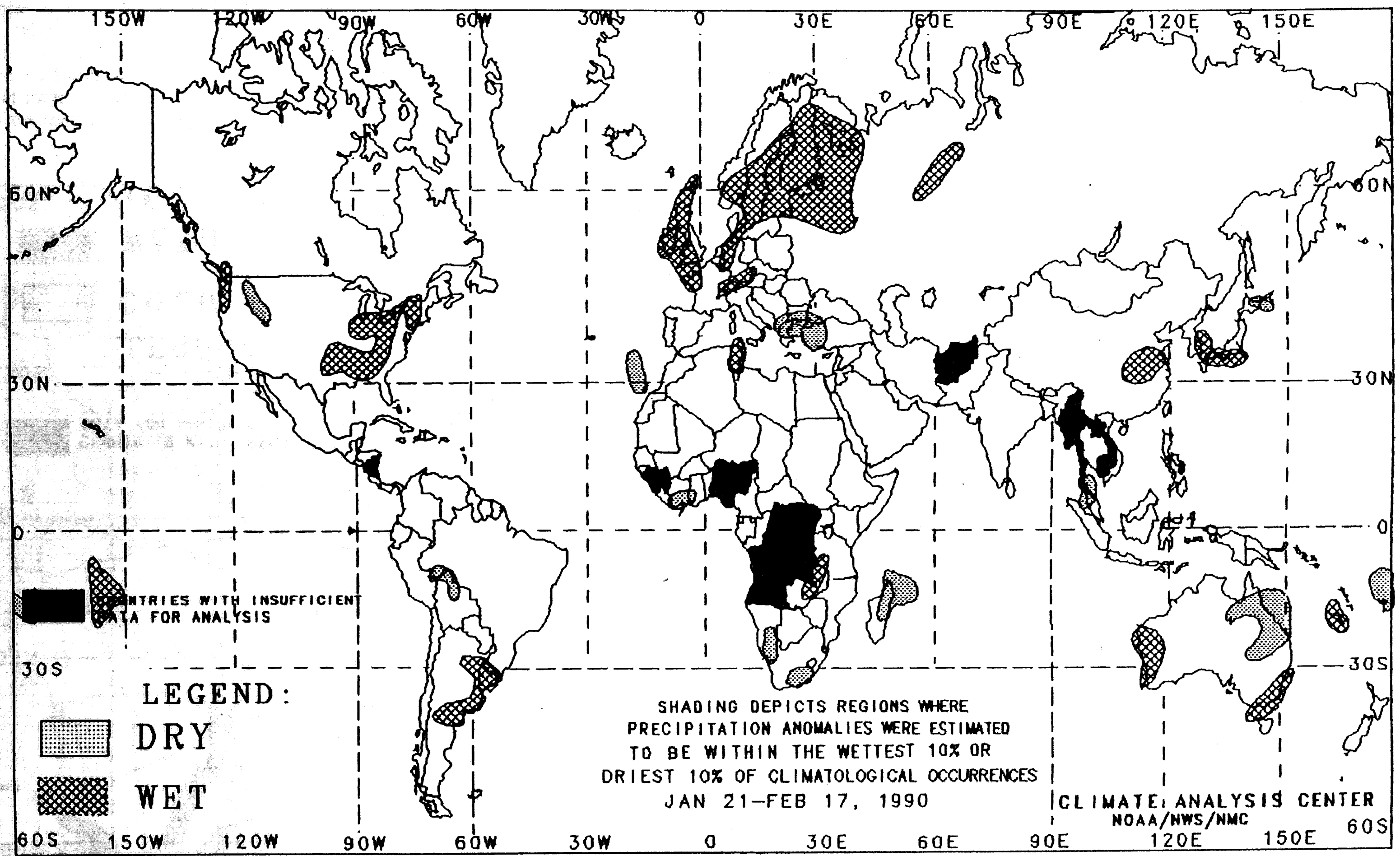
unless the magnitude of temperature

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

SPECIAL CLIMATE SUMMARY

EL NINO SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC ADVISORY 90/1

issued by

DIAGNOSTICS BRANCH

THE CLIMATE ANALYSIS CENTER

NATIONAL METEORALOGICAL CENTER, NWS

February 14, 1990

During the last several months, conditions in the tropical Pacific have once again been evolving towards a warm episode. Sea surface temperature anomalies have increased and low–level easterlies have decreased in the central equatorial Pacific. In January 1990, equatorial sea surface temperatures reached 0.5–1.0°C above normal in the vicinity of the date line (see Figure 1). However, sea surface temperature anomalies in the eastern equatorial Pacific remained near or slightly below zero.

In a remarkable reversal from the warmer than normal sea surface conditions that occurred during 1986–1987, below normal sea surface temperatures developed in mid–1988 and continued until early 1989 (see Figure 2). This reversal in the sign of sea surface temperature anomalies, which is a feature of the Southern Oscillation, was accompanied by changes in tropical and extratropical atmospheric circulation and precipitation that affected diverse sections of the globe.

In January 1990, for the first time since early 1988, the 28.5°C isotherm of sea surface temperature, considered to be the threshold temperature for the onset of strong convection, shifted east of the date line. The depth of the 20°C isotherm, an index for the depth of the oceanic thermocline (the boundary between the warm well–mixed surface layer and the deep cold water in the ocean), has been deeper during the last few months in the central Pacific than it was at any time during the 1985–1989 period. There was a fairly steady increase in the depth of this isotherm in the central and western equatorial Pacific from early 1988 through mid–1989, and a more gradual deepening during the past few months. The reservoir of warm water in the upper layer of the equatorial ocean in January 1990 is at least as great as that observed prior to the 1986–1987 warm episode.

Since November, convective activity, as indicated by the outgoing longwave radiation (OLR) measured from the NOAA–11 polar–orbiting satellite, has increased and become stronger than normal in the region of the anomalously warm water in the central equatorial Pacific. This is the first time since the latter stages of the 1986–1987 warm episode that enhanced convection has developed in this region.

Consistent with the above changes in the patterns of sea surface temperature and tropical convection in the western and central equatorial Pacific, low–level (850 mb) equatorial easterly anomalies, which characterized the cold episode, have been replaced by westerly anomalies during the last three months. There have been several periods when actual westerlies were observed west of the 180° longitude. A period of rather strong westerlies occurred in the western equatorial Pacific from mid–November to mid–December 1989. Westerlies in the western and central equatorial Pacific initiate oceanic Kelvin waves which propagate eastward towards the South American coast. These waves depress the oceanic thermocline, which in regions of strong oceanic upwelling results in higher sea surface temperatures. Kelvin waves initiated at that time began to reach the South American coast in late January, increasing the depth of the area's thermocline. Recent observations from stations along the South American coast indicate that the sea surface temperatures were rising during the last few days of the month.

The features described above have been observed during the onset of some warm episodes. However, most of the ENSO prediction models are indicating near normal conditions for the next several months. Given 1) that it has been nearly four years since the last warm episode, 2) that there has been a considerable build up in the volume of warm water in the equatorial zone, and 3) that low–level easterlies have weakened and convective activity has increased considerably in the central equatorial Pacific, the current situation deserves very close attention. The CAC will continue to monitor this situation and provide new information as it becomes available.

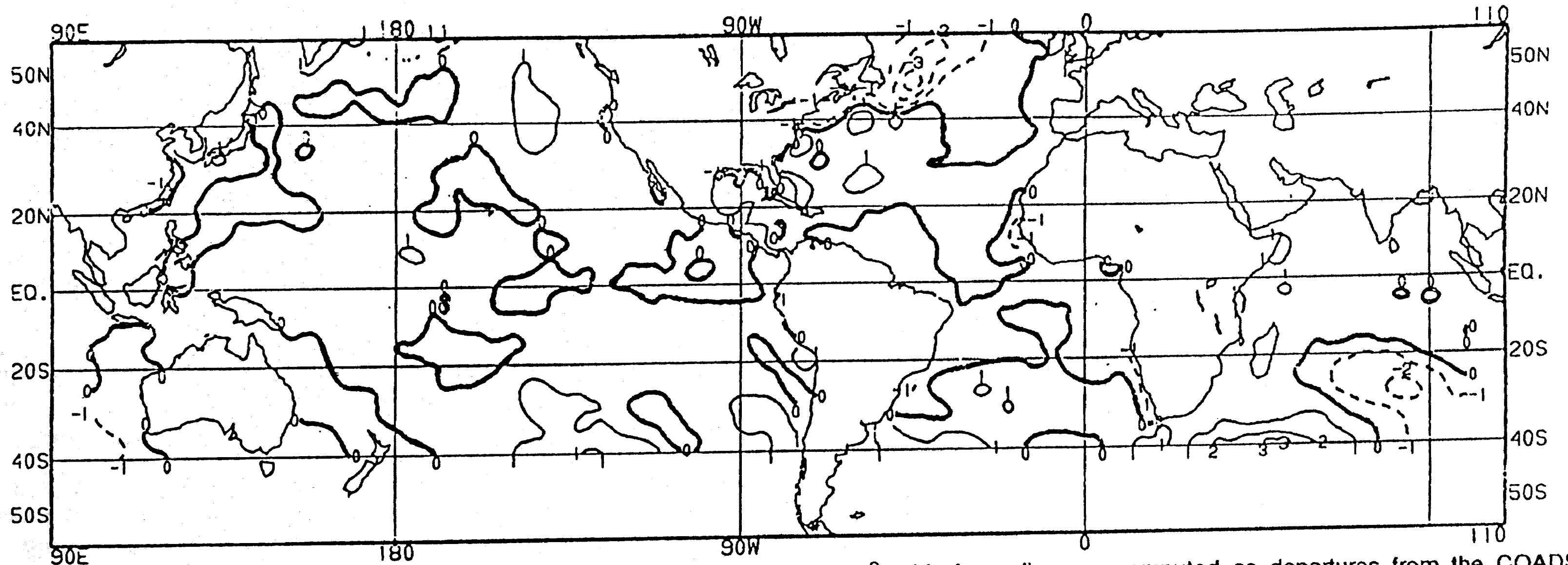


Figure 1. January 1990 sea surface temperature anomalies (°C) analyzed on a 2.5° grid. Anomalies are computed as departures from the COADS/ICE climatology (Reynolds, 1988, J. Clim., 1, 75-86). Anomaly contour interval is 1°C with negative anomalies dashed, positive anomalies thin solid, and the 0°C anomaly bold solid. Slightly above normal January SST anomalies (departures between +0.5°C and +1.0°C) prevailed in the central and western equatorial Pacific while near to slightly below normal January SST anomalies were recorded in the eastern equatorial Pacific. It was only a year ago (see Figure 2) that a large section of the central and eastern equatorial Pacific observed large negative SST anomalies (<-1°C) as the Southern Oscillation was in its "cold" phase.

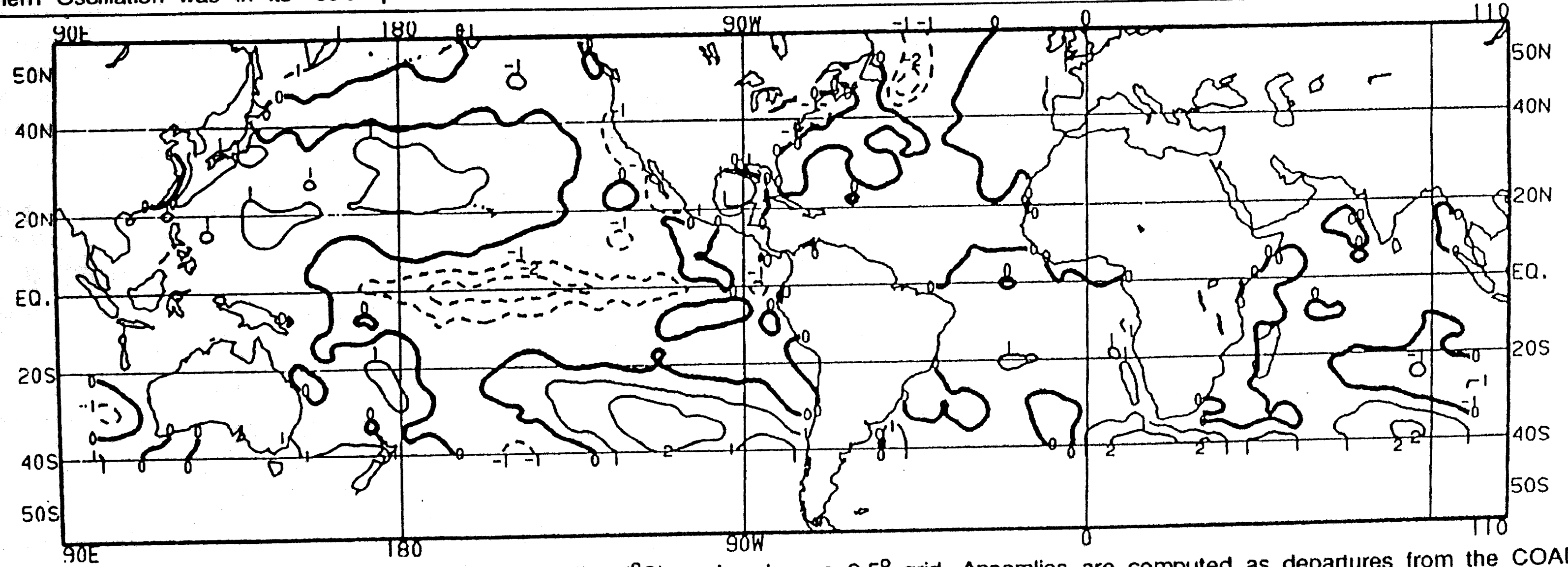
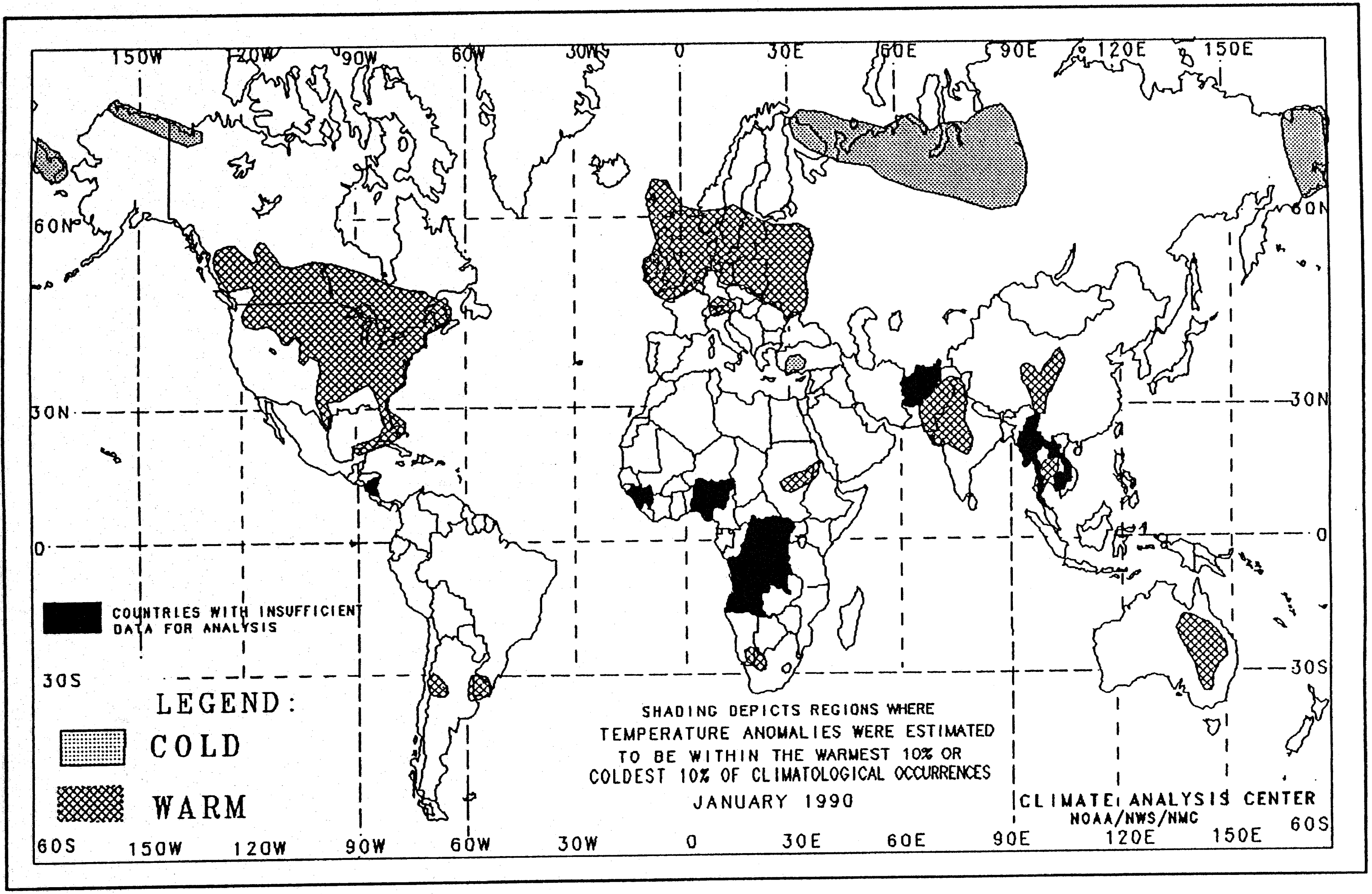


Figure 2. January 1989 sea surface temperature anomalies (°C) analyzed on a 2.5° grid. Anoamlies are computed as departures from the COADS/ICE climatology (Reynolds, 1988, J. Clim., 1, 75-86). Anomaly contour interval is 1°C with negative anomalies dashed, positive anomalies thin solid, and the 0°C anomaly bold solid. Below normal January SST anomalies dominated the central and eastern equatorial Pacific as the cold phase of the Southern Oscillation occurred from mid-1988 until early 1989. By January 1990, most of the negative SST anomalies had been replaced with near to slightly above normal SST anomalies (see Figure 1).

GLOBAL TEMPERATURE ANOMALIES

JANUARY 1990



The anomalies on this chart are based on approximately 2500 observing stations for which at least 26 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have reulted in an overestimation of the extent of some warm anomalies.

Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of one month temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

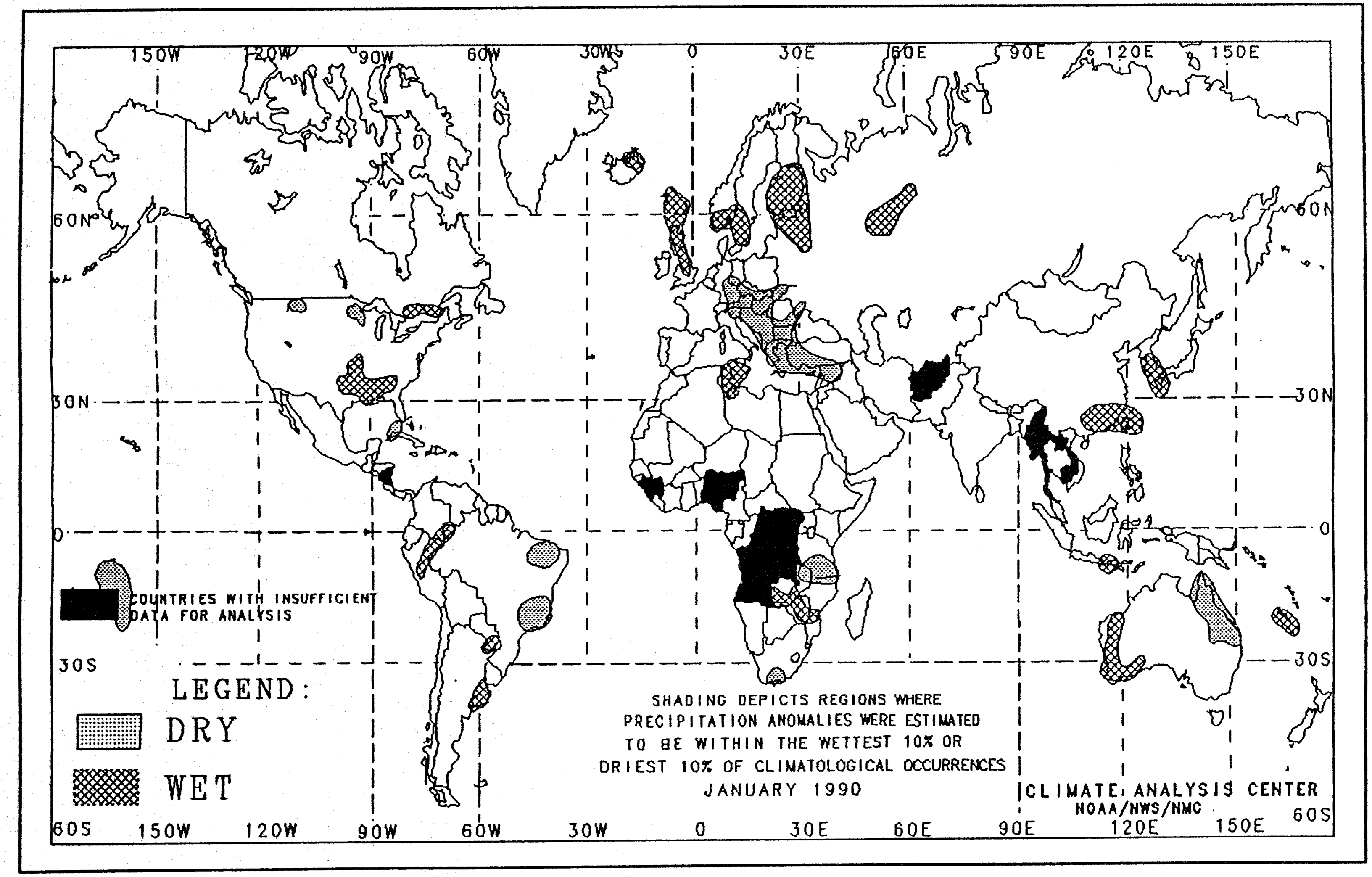
PRINCIPAL TEMPERATURE ANOMALIES

JANUARY 1990

REGIONS AFFECTED	TEMPERATURE AVERAGE (°C)	DEPARTURE FROM NORMAL (°C)	COMMENTS
NORTH AMERICA			
Northern Alaska and Adjacent Canada	–33 to –31	–5 to –7	COLD – 8 weeks
Southern Canada, United States, Mexico, and Cuba	–19 to +25	+2 to +10	MILD – 5 to 16 weeks
SOUTH AMERICA AND EASTERN PACIFIC			
Uruguay	+23 to +27	+2 to +3	WARM – 2 to 9 weeks
West Central Argentina	+26 to +28	Around +2	Very warm early and late in January
EUROPE AND THE MIDDLE EAST			
Northern European Soviet Union	–34 to –13	–4 to –7	COLD – 5 to 8 weeks
Western and Central Europe	–3 to +9	+2 to +6	MILD – 2 to 19 weeks
Switzerland and Austria	–9 to –5	+3 to +4	MILD – 6 to 19 weeks
Southwestern Turkey	–5 to +7	–3 to –5	COLD – 6 weeks
AFRICA			
Central Sudan	+22 to +26	Around +2	Very cool early and late in January
Southeastern Namibia and Adjacent South Africa	+28 to +29	Around +2	Very warm late in January
ASIA			
India and Pakistan	+5 to +23	+2 to +4	WARM – 2 to 4 weeks
Central China	–10 to 0	+2 to +5	WARM – 14 weeks
Thailand	+25 to +28	+2 to +3	Very warm first half of January
Eastern Siberia	–39 to –24	–6 to –8	COLD – 6 weeks
AUSTRALIA AND WESTERN PACIFIC			
Easterbn Australia	+27 to +34	+2 to +3	WARM – 2 to 7 weeks

GLOBAL PRECIPITATION ANOMALIES

JANUARY 1990



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the one month period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total one month precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of one month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

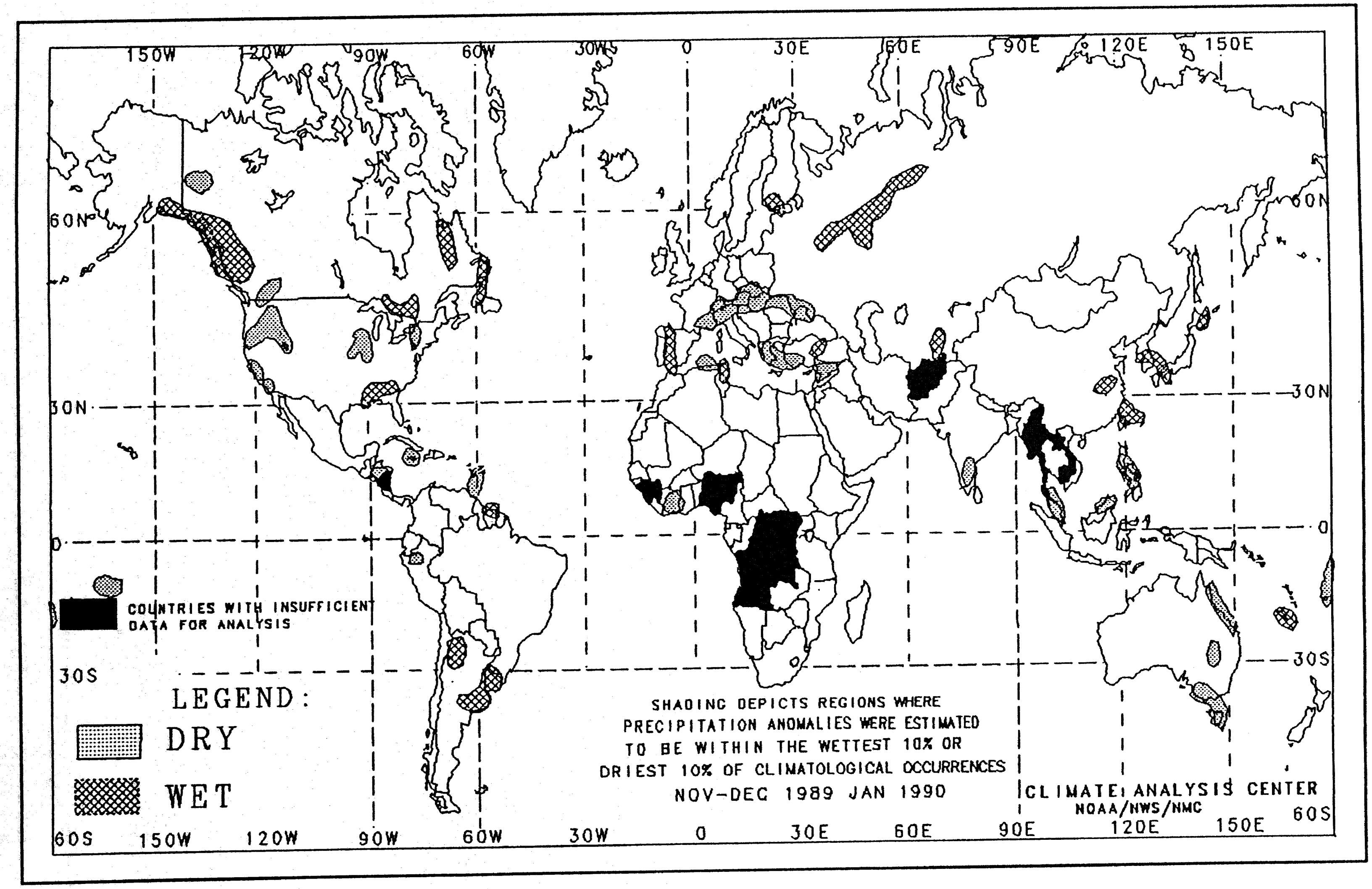
PRINCIPAL PRECIPITATION ANOMALIES

JANUARY 1990

REGIONS AFFECTED	PRECIPITATION TOTAL (MM)	PERCENT OF NORMAL	COMMENTS
NORTH AMERICA			
Montana	6 to 7	24 to 31	DRY – 5 weeks
Minnesota	1 to 3	7 to 13	DRY – 10 weeks
Southern Ontario and Southwestern Quebec	94 to 137	153 to 170	WET – 2 to 4 weeks
South Central United States	58 to 310	173 to 329	WET – 2 to 10 weeks
Southern Florida and Western Cuba	0 to 6	0 to 10	DRY – 6 to 7 weeks
SOUTH AMERICA AND EASTERN PACIFIC			
Cook Islands	32 to 109	11 to 28	DRY – 7 to 9 weeks
Peru and Adjacent Parts of Colombia and Brazil	466 to 684	174 to 182	WET – 3 to 5 weeks
Northeastern Brazil	1 to 86	1 to 47	DRY – 5 weeks
East Central Brazil	8 to 114	7 to 45	DRY – 4 weeks
Southeastern Paraguay	332 to 402	184 to 232	WET – 2 to 5 weeks
East Central Argentina	125 to 254	180 to 488	WET – 2 to 5 weeks
EUROPE AND THE MIDDLE EAST			
Iceland	100 to 281	192 to 230	Heavy precipitation second half of January
British Isles and Faroe Islnads	99 to 369	150 to 245	WET – 2 to 5 weeks
Southern Norway and Southern Sweden	93 to 176	197 to 237	WET – 2 to 5 weeks
Southern Finland and Northwestern European Soviet Union	48 to 106	165 to 268	WET – 2 to 5 weeks
East Central European Soviet Union	42 to 56	183 to 246	Heavy precipitation second half of January
Central and Southeastern Europe	0 to 73	0 to 42	DRY – 5 to 15 weeks
AFRICA			
Tunisia, Malta, and Libya	96 to 265	209 to 1722	WET – 2 to 14 weeks
Southern Tanzania and Adjacent Mozambique and Zambia	46 to 159	24 to 56	DRY – 4 weeks
Central Zimbabwe and Adjacent Mozambique and Zambia	368 to 499	158 to 200	WET – 4 weeks
Coast of South Africa	7 to 15	19 to 38	DRY – 10 weeks
ASIA			
South Korea and Western Japan	75 to 196	314 to 421	WET – 2 to 5 weeks
Taiwan and East Central China	92 to 784	161 to 298	WET – 4 to 10 weeks
AUSTRALIA AND WESTERN PACIFIC			
South Centeal Indonesia	438 to 744	185 to 328	WET – 3 to 4 weeks
Western Australia	51 to 257	264 to 1000	WET – 9 to 10 weeks
Northeastern Australia	10 to 135	5 to 44	DRY – 5 to 10 weeks
New Caledonia	372 to 396	248 to 327	Heavy precipitation second half of January

GLOBAL PRECIPITATION ANOMALIES

NOVEMBER 1989 – JANUARY 1990

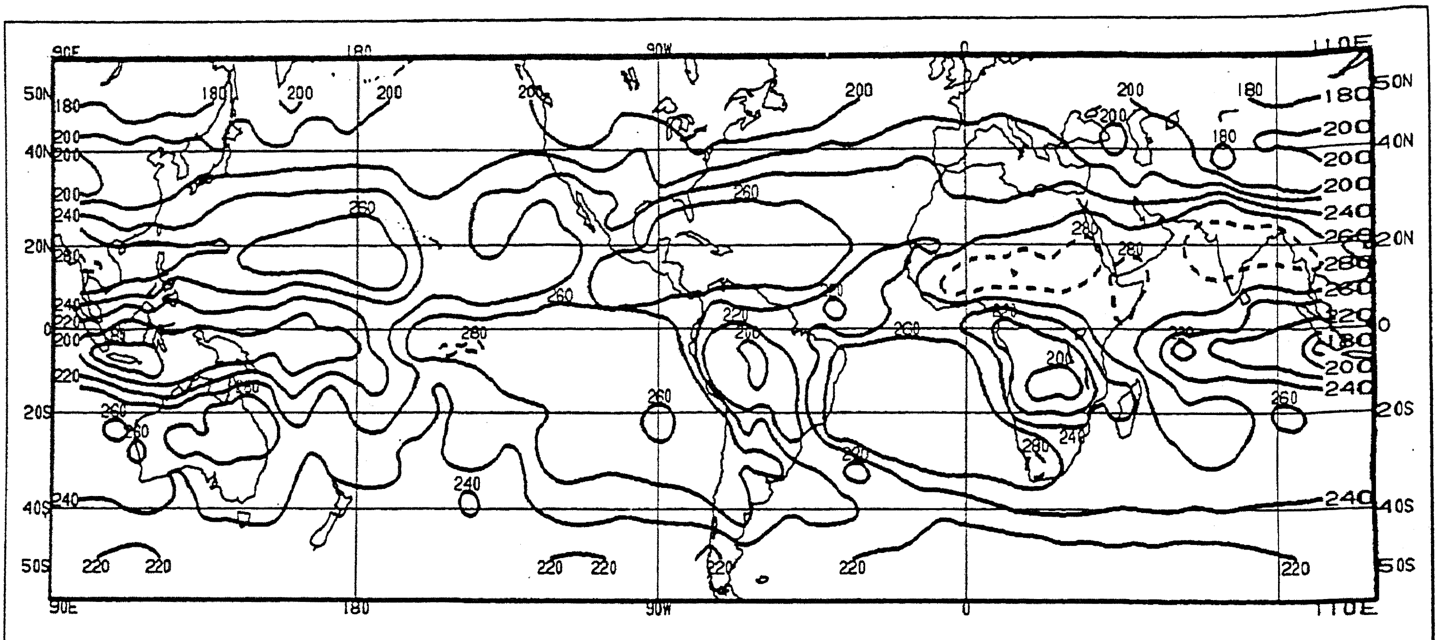


The anomalies on this chart are based on approximately 2500 observing stations for which at least 81 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the three month period is less than 50 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total three month precipitation exceeds 125 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of three month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

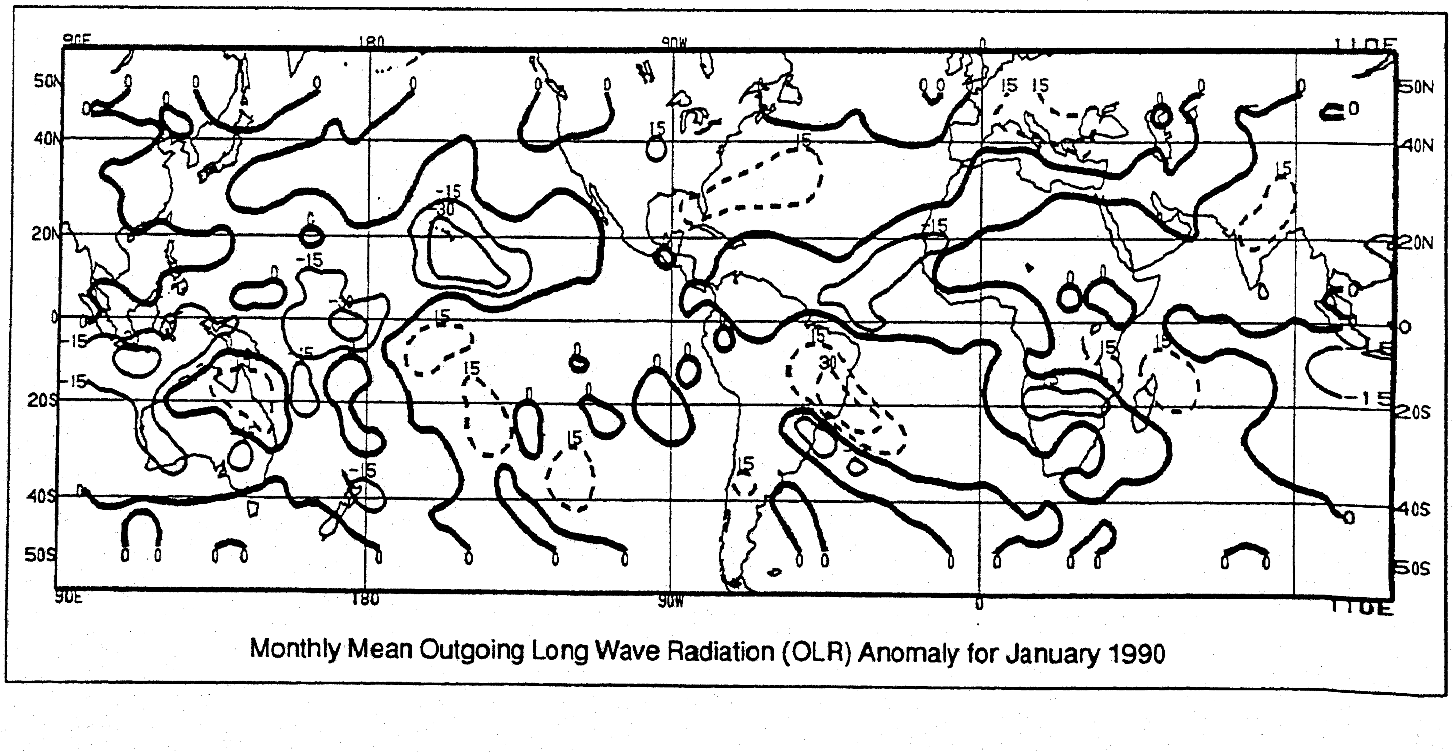


Monthly Mean Outgoing Long Wave Radiation (OLR) for January 1990

EXPLANATION

The mean monthly outgoing long wave radiation (OLR) as measured by the NOAA–9 AVHRR IR window channel by NESDIS/SRL (top). Data are accumulated and averaged over 2.5° areas to a 5° Mercator grid for display. Contour intervals are 20 Wm^{-2}, and contours of 280 Wm^{-2} and above are dashed. In tropical areas (for our purposes 20°N – 20°S) that receive primarily convective rainfall, a mean OLR value of less than 200 Wm^{-2} is associated with significant monthly precipitation, whereas a value greater than 260 Wm^{-2} normally indicates little or no precipitation. Care must be used in interpreting this chart at higher latitudes, where much of the precipitation is non–convective, or in some tropical coastal or island locations, where precipitation is primarily orographically induced. The approximate relationship between mean OLR and precipitation amount does not necessarily hold in such locations.

The mean monthly outgoing long wave radiation anomalies (bottom) are computed as departures from the 1979 – 1988 base period mean. Contour intervals are 15 Wm^{-2}, while positive anomalies (greater than normal OLR, suggesting less than normal cloud cover and/or precipitation) are dashed and negative anomalies (less than normal OLR, suggesting greater than normal cloud cover and/or precipitation) are solid.



Monthly Mean Outgoing Long Wave Radiation (OLR) Anomaly for January 1990